

Manos Juntas

School Desk Project



Instructions For Building a Desk

February 2014

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Introduction

Manos Juntas Ministry in Mexico is establishing new schools for children all along the Texas-Mexico border. The Director of Manos Juntas, Willie Berman, is a Methodist Missionary in Reynosa Mexico. Willie says they need 40-50 school desks for the children that will be coming to these new schools, and is asking Methodist Churches to build these desks and make them available to his Ministry. Willie has asked that the school desks be built as per the instructions in this booklet.

The design of this desk was largely based on the Junior School Desk design developed by the Methodist Midwest Mission Distribution Center (MMDC) in Chatham, IL. This Center is part of the UMCOR Network in the U.S. Many thanks to the MMDC for their help with this project.

Overview of Material Needed And Estimated Cost Per Desk

<u>Material</u>	<u>Quantity</u>	<u>Estimated Cost</u>
1"x4" No 2 Pine or Better	5 boards (8')	\$22.00
3/4" MDF w/melamine facing	Desk & Seat	\$13.00
1/4" MDF	Desk Encloser-Bottom	\$7.15
3" Standard Hinge	2	\$5.25
Carriage Bolts (28)	28	\$5.05
Flat Washers for Bolts (28)	28	\$2.50
Nuts for Carriage Bolts (28)	28	\$1.50
Drywall Screws - 1 1/4"	30	\$0.10
Drywall Screws - 1 5/8"	45	\$0.10
Polyurethane Stain/Lacquire	Small Portion of Pt. Can	\$1.20
Desk Top Lid Support	1	\$3.00
L Brackets - 1 1/2"	8 (2 packages of 4)	\$5.00
Estimated Cost of Materials -->		\$65.85

The above estimated costs assume that the materials are purchased in bulk where applicable, and does not included sales tax. These costs were taken from actual purchase costs from local stores in Houston Texas (Home Depot, Lowes, Ace Hardware, etc.)

Description of 1" x 4" Pieces

<u>Description</u>	<u>Lengths (inches)</u>	
	<u>Decimal</u>	<u>Fraction</u>
Desk Leg	24.25	24 1/4
Desk Leg	24.25	24 1/4
Desk Leg	24.25	24 1/4
Desk Leg	24.25	24 1/4
Front leg brace for Desk	45.25	45 1/4
Frnt 'box support for Desk top'	43.75	43 3/4
Back 'box support for Desk top'	43.75	43 3/4
Side of 'box support for Desk top'	17.25	17 1/4
Side of 'box support for Desk top'	17.25	17 1/4
Vertical leg for seat	14.25	14 1/4
Vertical leg for seat	14.25	14 1/4
Horizontal seat supports	8.875	8 7/8
Horizontal seat supports	8.875	8 7/8
Seat support between 2 legs	43.75	43 3/4
45° Angle supports for Seat	15.2	15 3/16
45° Angle supports for Seat	15.2	15 3/16
Floor Level Tie: Desk to Seat	30.25	30 1/4
Floor Level Tie: Desk to Seat	30.25	30 1/4

<u>1"x4"x8' Boards</u>				
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
24 1/4	45 1/4	43 3/4	43 3/4	43 3/4
24 1/4	24 1/4	17 1/4	30 1/4	30 1/4
24 1/4	17 1/4	14 1/4	15 3/16	15 3/16
8 7/8		14 1/4		
8 7/8				
90 1/2	86 3/4	89 1/2	89 3/16	89 3/16

Table above shows all the 1"x4" pieces that need to be cut. Table at left shows a recommended pattern on how to cut the five required 8' boards.

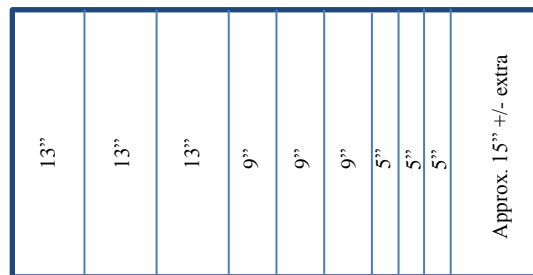
All 1"x4" should be No. 2 Pine or better in quality.

Other Materials Needed

<u>Description</u>	<u>Material or Size</u>	<u>Dimensions</u>
Seat	3/4" MDF w/melamine facing	9" x 48"
Desk Top - Fixed Base for Hinges	3/4" MDF w/melamine facing	5" x 48"
Desk Top - Hinged Lid	3/4" MDF w/melamine facing	13" x 48"
Desk Enclosure - Bottom	1/4" MDF	15 1/8" x 45 1/8"
L Brackets (8)	1 1/2"	--
Hinges (2)	3" Standard Hinge	--
Desk Top Lid Support (1)	Metal Friction/Folding Support	--
Carriage Bolts (28)	1/4" x 1 3/4"	--
Flat Washers for Bolts (28)	1/4"	--
Nuts for Carriage Bolts (28)	1/4"	--
Drywall Screws (~25)	1 1/4"	--
Drywall Screws (~25)	1 5/8"	--
Polyurethane Stain/Lacquer	Small portion of Pt. Can	--

Cautions

⚠ The 3/4" **MDF w/melamine facing** (double sided) is most economical to buy in 49" x 97" sheets and then cut pieces for the seat and desk top. One sheet is enough for all needed pieces for 3 desks plus an extra fixed base for hinges (5" x 48") and/or extra seat (9" x 48"). It is *best to use a blade that has a 'large number of smaller teeth' which is designed for cutting this material (i.e. blade with 40-60 smaller teeth on a 7 1/4" blade for skill saw)*. If this material is cut with a more standard blade (i.e. multi-purpose or framing blade) the melamine along the cut edge will likely be very chipped).



← 4' x 8' Sheet of
MDF w/melamine
facing

⚠ When buying the **L brackets** and **Hinges**, ensure that the screws that come with these are 5/8" – 3/4" in length so as not to go all the way through the 1" x 4" or 3/4" MDF.

Tools Needed

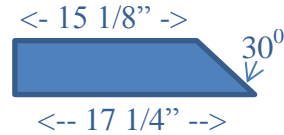
- Power Drill/Driver with assorted drill bits and bits for Phillips head screws
- Small square
- Carpenter's square
- Skill saw with
 - blade for cutting 1" x 4" (standard blades will work)
 - blade for cutting the MDF with melamine facing (best to have blade with large number of small teeth, ie. for 7 ¼" blade this would be 140 teeth; standard blade will not cut the MDF w/melamine as clean and chip the melamine along the cut edge)
- Hammer
- Clamps (2 -4)
- Ratchet socket wrench or Open end wrench
- Steel tape measure
- Bit for countersinking drywall screws
- Paint brushes
- Small Level
- Sandpaper
- Pencil

Tools That Are Helpful To Have

- Power Miter Saw
- 2nd Power Drill/Driver or Power Impact Driver
- Table Saw for cutting MDF with melamine facing; need blade with high density of teeth
- Power sander

How To Assemble Desk

The 1st step is to assemble the ‘box’ on which the desk top will be attached. This is to be made from the 1” x 4” front and back box supports for the desk top (43 3/4”) and the 2 sides of the box support (17 1/4”). Before assembling, cut one end of each of the side supports at a 30 degree angle. See drawing at right.



Set the 2 sides on a flat surface far enough apart to place the front and back support pieces in between them. Line up the back support piece with the square end of the side pieces and use a square to make sure the corner is square. Attach these 3 pieces using 3 drywall screws in both corners (use 1 5/8” screws). It is best to pre-drill and countersink a hole for each screw before applying to reduce splintering of wood and ensure screw head is safely below wood surface. Next line up the outside of the front support piece adjacent to the ‘shorter corner’ (~ 15 1/8”) of the side supports and attach with 3 drywall screws as done above. Use square to ensure that the corners are square. See picture at right.



Next attach the ‘fixed desk piece’ (5” x 48”) to the desk support box just assembled. Place the ‘fixed desk piece’ topside down and lay the support box upside down on top of it. Center the support box long wise on the ‘fixed desk piece’ and line up the back side of the support box parallel to the back and 5/8” from the back edge. Once in place, use the clamps to firmly hold the two pieces together. Connect these two pieces together using 4 L brackets. It is recommended that you place 1 bracket adjacent to each side support piece and space the remaining two brackets along the back support piece. Use the screws that came with the L brackets to connect these two pieces together. Be sure that the screws are not longer than about 3/4” so they do not go all the way through the desk top or the 1” x 4”. It is recommended that the screw holes in the desk top be predrilled. See picture above.



Next attach the four legs of the desk (1"x4"x24 1/4") to the corners of the desk top support box just assembled. The front two legs should be attached on the outside and lined up flush with the front corners of the support box, not the front edge of the 'fixed desk piece'. Use the carriage bolts to attach the legs. Clamp the legs to the support box ensuring that they are square with the bottom of the support box. Once a leg is clamped in place, drill two 1/4" holes through leg and side of support box in which carriage bolts will be inserted. It is recommended that the 2 holes be drilled in a 'diagonal' pattern (see picture at right). Be careful in placement of holes for the carriage bolts to ensure that there is sufficient room inside support box to work with flat washers and nuts that must be attached to bolts. Insert carriage bolts from outside such that washer and nut is inside desk enclosure.



After front legs are attached, attach back 2 legs in a similar manner. Again line up the back legs ensuring that they are square with the support box AND also lined up adjacent to



the 'shorter corner' (~ 15 1/8") of the side support pieces. Drill 1/4" holes for 2 carriage bolts in diagonal pattern ensuring that there is sufficient room inside of support box to work with the flat washers and nuts that must be attached to bolts. Again insert bolts from outside such that washer and nuts are inside desk enclosure. See picture above.

After 4 legs of desk are attached then attach bottom of the desk enclosure. Cut this piece from 1/4" MDF board and it should be 15 1/8" x 45 1/8". Once it is cut, center on the bottom of the desk and attach with 1 1/4" drywall screws. It is recommended that all the screw holes be predrilled and countersunk to prevent wood splits as well as ensure that the heads of the screws are flush or below the surface of the 1/4" MDF. Use approximately 3 screws along the sides of the desk and 5 along the front and back. See picture at right.



Next step is to connect the front leg brace (1" x 4" x 45 1/4") between the two front legs. The bottom of the brace should be approximately 12 1/2" from the floor or bottom of the front legs. Connect the brace between the 2 front legs using 3 drywall screws (1 5/8") in each of the front legs. It is recommended that the 3 screw holes for each leg are predrilled and countersunk to best ensure that the wood does not split and that the heads of the screws are safely flush or below the wood. See 2 pictures above.



This completes the desk structure until the desk top-hinged lid and hinges are attached.

Next step is to build the support structure for the seat. First step is to connect the seat support between the 2 legs (1" x 4" x 43 3/4") to the 2 horizontal seat supports (1" x 4" x 8 7/8"). Mark the center of the horizontal seat supports on one edge and the center of the support structure for the seat and line up the center marks as shown in the picture to right and attach the two pieces using 3 drywall screws (1 5/8") on each end. As above, it is recommended that the screw holes are predrilled and countersunk. Use square to ensure two pieces are perpendicular.



NOTE: See 'Modification made to horizontal seat supports' shown on next page.

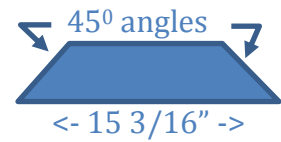
Next step is to attach the two vertical legs for seat (1" x 4" x 14 1/4") to the ends of the seat support structure assembled above. Mark the center of the legs and line the center up with the center of the horizontal seat supports from above. Use square to ensure that legs are perpendicular to horizontal seat support. Clamp into place once lined up. Drill two 1/4" holes on diagonal pattern for two carriage bolts to attach the two pieces together. Insert carriage bolts from outside such that the washer and nut are under the seat when completed.



Next step is to attach the completed seat support structure to the seat (9" x 48" of 3/4" MDF w/melamine facing). Center the seat support structure on the seat (seat is top down as shown in pictures). Once centered in both directions firmly clamp the two pieces together. Then connect the two pieces together with four L brackets described on page 5. Connect one L bracket to a horizontal seat support on each end of the seat support structure and space out the remaining two along the seat support between the 2 legs. The L brackets along the seat support between the two legs should be placed around 11" – 12" from the horizontal seat supports to ensure that they do not get in the way of attaching the 45° angle supports for the seat, which is the next step. It is recommended that the L bracket screw holes going into the bottom of the seat be predrilled with a *small* bit and only 1/2" or less to ensure that the seat material does not chip or breakaway when tightening screws. Also make sure screws for L brackets are not over 3/4" in length or they will go all the way through the seat and 1" x 4".



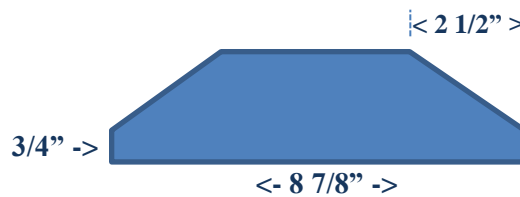
Next step is to attach the two 45° angle supports for the seat. These pieces are 15 3/16" long and cut at 45° angles on each end. See sketch at right.



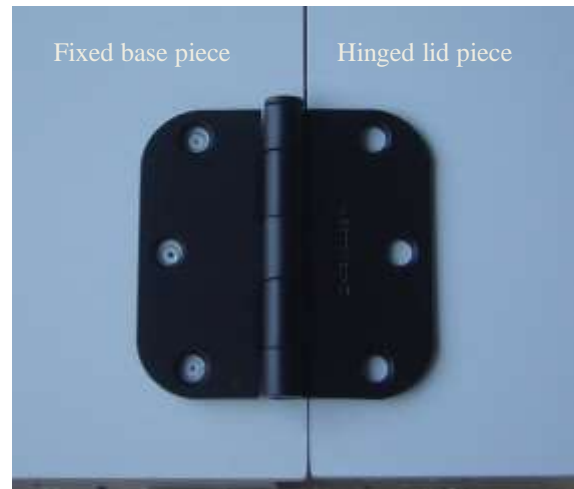
Attach these two supports to bottom side of seat as shown in the picture at right. Use 3 drywall screws (use 1 1/4" and 1 5/8" screws, but ensure that screws do not go all the way through the 45° angle support) to attach this piece to the vertical seat legs. It is recommended that each screw hole is predrilled and countersunk to ensure the wood does not split and the head of the screw is flush or below the surface of the wood. Similarly attach the 45° angle piece to the horizontal seat support using 3 drywall screws (only use 1 1/4" screws for this). It is recommended that each screw hole is predrilled and countersunk to ensure the wood does not split and the head of the screw is flush or below the surface of the wood.



Modification made to horizontal seat supports (1" x 4" x 8 7/8"): It is recommended that the 2 horizontal support pieces be slightly modified from the above pictures for safety reasons. In order to remove the sharp corner exposed at the bottom of the seat support structure, the bottom corners of these two pieces are to be cut as shown in the sketch and pictures at right. All other assembly instructions shown on pages 11 and 12 are unchanged.



Next step is to attach the desk top-hinged lid (13" x 48" piece of 3/4" MDF w/melamine facing) to the desk top-fixed base (5" x 48" piece of 3/4" MDF w/melamine facing) that was previously attached to the desk. The 2 pieces of the desk top are connected by the hinges. Set the hinged lid piece on the desk structure that was completed earlier. Make sure that the side edges of the fixed base and the hinged lid pieces are flush. Then set the 3" hinges over the break between these two pieces as shown in the picture at right. The hinges on each side should be the same distance from the side edges, about 3/4". Place the hinge over the gap between the 2 pieces such that the pin of the hinge is completely resting on the fixed base piece and lined up with the gap, see picture.



Connect the hinge to the fixed base piece first. It is recommended that care be taken when attaching the hinges to both pieces. After the hinges are in place, mark the center of the screw holes with a pencil, then use a punch to indent the desk top pieces, and then predrill a small and shallow hole for each screw. Taking this care will better ensure that the hinges will be in the proper place when the screws are tightened. Attach both hinges to the fixed base piece then to the hinged lid piece.



Ensure screws that come with hinges are 3/4" or less in length so that they do not go all the way through the desk top pieces.



Next step is to attach the floor level tie (1" x 4" x 30 1/4") between the desk structure and the seat structure. Attach the floor level tie to the front legs first. Line up the tie inside the legs and flush with the front edge of the legs. Use a small square to ensure that the legs and the floor level tie piece are perpendicular to edge other. Once pieces are lined up properly, use clamps to hold the two pieces in place and drill two 1/4" holes for carriage bolts. Holes should be drilled in a diagonal. Insert the carriage bolts from the outside, and attach a washer and nut on each.



After the front leg(s) are attached to the tie piece, attach to the back leg(s) of the desk structure. Use a square to make sure that the back legs are perpendicular with the tie piece, then clamp in place. Drill 1/4" holes on diagonal for carriage bolts. Insert bolts from the outside and attach a washer and nut on each.



Next step is to attach the seat structure to the floor tie piece. Line up the back of the seat leg flush with the back of the floor tie piece. Use a small square to ensure that the seat leg is perpendicular to the floor tie piece. Once in place, use clamps to hold them in place when drilling 1/4" holes for the carriage bolts. Connect these two pieces using 4 carriage bolts in a 'square' pattern. Insert the carriage bolts from the outside and attach a washer and nut to each.



The picture at right shows the desk structure and the seat structure attached to the floor tie piece. All carriage bolts are inserted from the outside and securely tightened. Also shown is the two desk top pieces attached by the hinges



Next step is to attach a ‘lid support’ of some type to the hinged desk top piece to enable the lid to be supported in the open position. This simple hardware will help prevent fingers and hands from being pinched by a falling desk lid.

There are many types of these supports available in most hardware stores. The one shown in the picture at right is simply called a “Lid Support Hinge”. It folds in half when the desk is closed and can be ‘locked’ open as shown here. An option also is spring loaded hinges; most of these are more expensive but should work fine also if the springs are strong enough to lift/support the weight of the desk lid.



Final step is to ensure that all edges of 1” x 4” and desk top pieces are sanded and smooth. Please ensure that any sharp edges are smoothed and any places that could cause a child to get a splinter are sanded and smooth. Use of a power sander can save time if available.

Around edges of desk top and seat (of the 3/4” MDF with Melamine facing) it is added safety to paint them with a polyurethane or lacquer to seal the edges and prevent future splintering or peeling. Cover these edges with at least 1 coat and preferably 2 coats.

Building Material Options

- Carriage Bolts:** use of 1/4" x 1 3/4" carriage bolts are recommended. They can be hard to find at some popular hardware stores. These stores frequently carry 1 1/2" and 2" bolts, but not 1 3/4". If you use 2" carriage bolts, they do 'stick out' about 1/2" after washer and nut are attached. This leaves a potentially dangerous length of the bolt exposed for children's hands or feet to come in contact with. It is recommended that if 2" bolts are used, each bolt should be capped with a protective plastic cap of some kind. In the picture at right see a protective cap installed on 2" bolts that are 'small shelf caps' that are used on cut ends of metal shelving. These are available at most stores that sell 'do it yourself' metal shelving and they cost about \$0.06 each when bought in a bulk package of 100.
- Hinges:** these instructions include the use of two 3" standard hinges for attaching the two desk top pieces together. Another option is to use one or two 'continuous hinges' (sometimes called 'piano hinges') that are strong enough to securely support the hinged lid piece and will not wear out with use. These hinges are more expensive than the standard hinges.
- Desk Top Material:** These instructions include the use of 3/4" MDF with melamine facing on both sides. The melamine is a very smooth surface that is resistant to moisture and scuffing. This material is usually used for 'do it yourself' shelving. An option is to use 3/4" MDF without the melamine facing, but this would need to be sanded and coated with a polyurethane or lacquer to make it smooth and resistant to moisture and 'wear and tear'. Another option would be to use 3/4" MDF with melamine facing on one side only, and ensure that the melamine facing is on the top of the desk and seat.



Parts and Dimensions

